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10/026,435	12/27/2001	Herman Joris Casier	Q67690	1564

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EXAMINER

SWERDLOW, DANIEL

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/026,435

Applicant(s)

CASIER ET AL.

Examiner

Daniel Swerdlow

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/12/02
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. Applicant admits on page 6, lines 11-12 that the line driver depicted in Fig. 1 is "known from the prior art". See MPEP § 608.02(g).
2. The drawings are objected to because in Fig. 2, the word --non-linear-- is misspelled as "non-lineair" in the descriptive legend for reference 3.
3. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 13 through 15 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 13 claims a method for amplifying an input signal including a step of "providing a line driver ... such as in claim 1". As such, the claim is drawn to both a method (i.e., a process) and an apparatus (i.e., a machine), namely the line driver of Claim 1. Because the statute is drafted so as to set forth the classes of invention in the alternative only, the claim is drawn to non-statutory subject matter.
6. Claims 14 and 15 are non-statutory due to dependence from Claim 13.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 4 and 13 through 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
9. Claim 4 recites the limitation "the second input terminal of the linear amplifier" in lines 5-6. There is insufficient antecedent basis for this limitation in the claim. In order to advance prosecution to the maximum degree possible, examiner makes prior art rejections below based of the interpretation that the recitation is intended as --an input terminal of the linear amplifier--.

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10. Regarding Claim 13, the phrase "such as" in line 14 renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

11. Further, as stated above under *Claim Rejections - 35 USC § 101* Claim 13 is drawn to both a method and an apparatus. As such it is unclear which statutory class of invention is claimed and the claim is indefinite. See MPEP § 2173.05(p)II.

12. In addition, Claim 13 recites the limitations:

- "the input terminal" in line 15
- "the non-linear amplifier" in line 18
- "the first output signal" in line 19
- "the first output terminal" spanning lines 19 and 20
- "the second output terminal" spanning lines 26 and 27

There is insufficient antecedent basis for these limitations in the claim.

13. Claims 14 and 15 are indefinite due to dependence from Claim 13.

14. In order to advance prosecution to the maximum degree possible, examiner makes prior art rejections below based of the interpretation that the reference to the structure of the line driver of Claim 1 is intended as an example only and does not limit Claim 13 and that indefinite articles (i.e., a and an) were intended in the recitations lacking antecedent basis.

***Claim Rejections - 35 USC § 102***

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Stewart et al (Feedforward Linearisation of 950 MHz Amplifiers).

17. Regarding Claim 1, Stewart discloses a feedforward circuit configuration (Fig. 1) for use in amplifiers for cable television systems (i.e., line drivers) (Introduction) comprising: a main amplifier (main) with distortion (i.e., a non-linear amplifier) that provides an output signal (i.e., a first output signal) into a coupler (C3) amplifying a two tone input signal into coupler (C1); an auxiliary (i.e., analog linear) amplifier (aux) providing an output signal (i.e., a second output signal) into coupler C4 based on cancellation (i.e., difference) of the input signal and the main amplifier (i.e., first) output signal and, therefore, in parallel with and dependent on the main amplifier; and a coupler (C4) (i.e., combining means) to provide an output signal (Theory).

18. Regarding Claim 2, in addition to the elements of Claim 1, the auxiliary amplifier (aux) delay element (T1) attenuator (A) and combiner (C2) disclosed by Stewart are arranged to accomplish cancellation between the main amplifier output and the input signal and, as such, constitute a comparator.

### ***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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20. Claims 1, 3, 4, 6 through 10 and 12 through 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art in view of Stewart.

21. Regarding Claim 1, applicant's disclosure admits as prior art (Fig. 1; page 1, line 31 through page 2, line 15) a line driver comprising a non-linear digital amplifier (19, 21, 23) arranged to provide a first output signal (output of FI 23) amplifying an input signal (output of DMT 2). Therefore, admitted prior art discloses all elements of Claim 1 except: an analog linear amplifier providing a second output signal based on the difference between the input signal and the first output signal, placed in parallel with said non-linear amplifier and being dependent thereon, and combining means arranged to combine said first output signal and said second output signal to provide a total output signal to an output line. Stewart discloses a feedforward amplifier linearization configuration (Fig. 1) in which the output (i.e., second output) of a linear (i.e., analog linear) amplifier (Fig. 1, aux) whose input is based on a cancellation (i.e., difference) between the input signal and the output (i.e., first output) of a non-linear amplifier (main) and, therefore, operates in parallel with and dependent on the main (i.e., non-linear) amplifier. Stewart further discloses a coupler (C4) (i.e., combining means) that combines the respective amplifier outputs to provide an output signal. Stewart further discloses (Theory) that such a configuration results in "a significant reduction in distortion level". As such, it would have been obvious to one skilled in the art at the time of the invention to apply the feedforward amplifier linearization configuration taught by Stewart to the line driver admitted as prior art by applicant for the purpose of reducing distortion.

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22. Regarding Claim 3, applicant further admits that the admitted prior art switch mode line driver (i.e., the first output signal) (Fig. 1, reference 17; page 7, lines 22-29) produces 95% of the required output signal power.

23. Regarding Claim 4, as shown above apropos of Claim 1, the combination of admitted prior art and Stewart makes obvious all elements except the line driver comprising a digital to analog converter arranged to convert the input signal to an analog input signal. Examiner takes Official Notice of the fact that digital to analog converters were well known in the art at the time of the invention. Further, one skilled in the art would have known that a digital to analog converter would be required to adapt a digital input signal such as the DMT output in the line driver of applicant's admitted prior art to the input of the analog linear amplifier in the feedforward linearization circuit disclosed by Stewart. As such, it would have been obvious to one skilled in the art at the time of the invention to apply the well-known analog to digital converter to the combination made obvious by admitted prior art and Stewart for the purpose of operatively coupling the input signal to the linear amplifier.

24. Regarding Claim 6, applicant further admits as prior art the non-linear amplifier being a switching mode amplifier (page 1, line 31 through page 2, line 10).

25. Regarding Claim 7, applicant further admits as prior art a hybrid (Fig. 1, reference 9). Stewart discloses a coupler (Fig. 1, reference C4) that combines the non-linear amplifier output with the linear amplifier output (Theory). Applicant does not claim or disclose any detail of the hybrid structure. As such, the integration of the coupling function of Stewart into the admitted prior art hybrid is simple integration without an unexpected result and is not patentably distinct



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from the combination of admitted prior art and Stewart shown above to be obvious. See *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965).

26. Regarding Claim 8, applicant further admits as prior art generation of the input signal by a DMT (Fig. 1, reference 2).

27. Regarding Claim 9, applicant further admits as prior art the use of an active back termination circuit (page 1, lines 20-26). Applicant further admits that it was well known that the use of the active back termination reduces power consumption and enhanced efficiency (page 2, lines 13-15). As such, it would have been obvious to one skilled in the art at the time of the invention to apply the well-known active back termination to the combination made obvious by admitted prior art and Stewart for the purpose of reducing power consumption and enhancing efficiency.

28. Regarding Claim 10, applicant's disclosure admits as prior art (Fig. 1; page 1, line 31 through page 2, line 15) a non-linear digital amplifier (19, 21, 23) serving as an independent current source. Therefore, admitted prior art discloses all elements of Claim 10 except an analog linear amplifier serving as a voltage source dependent on the non-linear digital amplifier wherein the output of the combined amplifier is a combination of the outputs of the non-linear digital amplifier and the analog linear amplifier. Stewart discloses a feedforward amplifier linearization technique in which the output of a linear amplifier (Fig. 1, aux) whose input is based on the output of a non-linear amplifier (main) is combined with the output of the non-linear amplifier (C4). Stewart further discloses (Theory) that such a technique results in "a significant reduction in distortion level". As such, it would have been obvious to one skilled in the art at the time of the invention to apply the feedforward amplifier linearization technique taught by Stewart to the

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non-linear digital amplifier admitted as prior art by applicant for the purpose of reducing distortion.

29. Regarding Claim 12, applicant further admits as prior art the non-linear amplifier being a switching mode amplifier (page 1, line 31 through page 2, line 10).

30. Regarding Claim 13, applicant's disclosure admits as prior art (Fig. 1; page 1, line 31 through page 2, line 15) amplifying an input signal by: providing a line driver (17); feeding the line driver at an input terminal with an input signal (output of DMT 2); amplifying the input signal with a non-linear amplifier (19, 21, 23); and providing a first output signal at a first output terminal (output of FI 23). Therefore, admitted prior art discloses all elements of Claim 13 except: a second amplifying step, performed in parallel with said first amplifying step and comprising a digital to analog conversion of the input signal to an analog input signal, and comparing the analog input signal with the first output signal using an analog linear amplifier; providing a second output signal at the second output terminal; and a combination step comprising combining said first output signal with said second output signal to obtain a total output signal to an output line. Stewart discloses a feedforward amplifier linearization technique with an auxiliary amplifier (aux) (i.e., a second amplifying step in parallel with the first using an analog linear amplifier) providing an output signal (i.e., a second output signal) into coupler C4 based on cancellation (i.e., comparison) of the input signal and the main amplifier (i.e., first) output signal and, therefore, in parallel with and dependent on the main amplifier; and a coupler (C4) (i.e., combination step) to provide an output signal from the amplifier outputs (i.e., combining said first output signal with said second output signal to obtain a total output signal to an output line) (Theory). Stewart further discloses (Theory) that such a technique results in "a

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significant reduction in distortion level". As such, it would have been obvious to one skilled in the art at the time of the invention to apply the feedforward amplifier linearization technique taught by Stewart to the non-linear digital amplifier admitted as prior art by applicant for the purpose of reducing distortion. Therefore, the combination of admitted prior art and Stewart makes obvious all elements except a digital to analog conversion of the input signal to an analog input signal. Examiner takes Official Notice of the fact that digital to analog converters were well-known in the art at the time of the invention. Further, one skilled in the art would have known that a digital to analog converter would be required to adapt a digital input signal such as the DMT output in the line driver of applicant's admitted prior art to the input of the analog linear amplifier in the feedforward linearization circuit disclosed by Stewart. As such, it would have been obvious to one skilled in the art at the time of the invention to apply the well-known analog to digital converter to the combination made obvious by admitted prior art and Stewart for the purpose of operatively coupling the input signal to the linear amplifier.

31. Regarding Claim 14, applicant further admits as prior art a hybrid (Fig. 1, reference 9). Stewart discloses a coupler (Fig. 1, reference C4) that combines the non-linear amplifier output with the linear amplifier output (Theory). Applicant does not claim or disclose any detail of the hybrid structure. As such, the integration of the coupling function of Stewart into the admitted prior art hybrid is simple integration without an unexpected result and is not patentably distinct from the combination of admitted prior art and Stewart shown above to be obvious. See *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965).

32. Regarding Claim 15, applicant further admits as prior art generation of the input signal by a DMT (Fig. 1, reference 2).

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33. Claims 5 and 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art in view of Stewart as applied to Claims 1 and 10, respectively, above, and further in view of Briffa et al. (US Patent 6,075,411).

34. Regarding Claim 5, as shown above apropos of Claim 1, the combination of admitted prior art and Stewart makes obvious all elements except the linear amplifier being selected from the group consisting of class A and Class A/B amplifiers. Briffa discloses that the error amplifier in a feedforward linearizer needs to be linear and is generally a class A amplifier for this reason (column 2, lines 10-13). It would have been obvious to one skilled in the art at the time of the invention to apply the class A amplifier taught by Briffa to the combination made obvious by admitted prior art and Stewart for the purpose of achieving the necessary linearity of the amplifier.

35. Regarding Claim 11, as shown above apropos of Claim 10, the combination of admitted prior art and Stewart makes obvious all elements except the linear amplifier being selected from the group consisting of class A and Class A/B amplifiers. Briffa discloses that the error amplifier in a feedforward linearizer needs to be linear and is generally a class A amplifier for this reason (column 2, lines 10-13). It would have been obvious to one skilled in the art at the time of the invention to apply the class A amplifier taught by Briffa to the combination made obvious by admitted prior art and Stewart for the purpose of achieving the necessary linearity of the amplifier.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 703-305-4088. The examiner can normally be reached on Monday through Friday between 8:00 AM and 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forrester Isen can be reached on 703-305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Swerdlow, Patent Examiner Art Unit 2644